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PRELIMINARY ENVIRONMENTAL REVIEW AND REPORT TO THE BOARD

BROADVIEW-ALKALI CREEK 230 kV TRANSMISSION LINE

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SEPTEMBER 1976

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Recommendations and Conclusions

The Department of Natural Resources and Conservation recommends to the Board of Natural Resources and Conservation that The Montana Power Company be permitted to build a 230 kV transmission line connecting its Broadview and Alkali Creek substations within a two-mile-wide corridor, the center of which is the existing Billings-Great Falls 230 kV transmission line.

The Department also recommends that the Certificate of Environmental Compatibility and Public Need be granted on the condition that the applicant obtains approval from the Board regarding detailed construction methods and plans, as well as the locations of the centerline, access roads, and staging areas in order to minimize environmental impacts. The applicant should also be required to consult with land owners and the Department to establish these details prior to obtaining Board approval.

Where possible, the selection of a centerline within the corridor should follow property boundary lines and existing fence lines, and should accommodate as much as possible the land owners' preferences. The Department recommends that the Certificate be granted on the condition that the applicant establishes a date by which the existing 100 kV and 50 kV transmission lines in the corridor will be completely removed, as indicated in the application, and that associated damage to land owners' property will be repaired.

The Department further recommends that the applicant and its contractors be required to follow construction practices which will result in minimum environmental impact, including impact upon visual characteristics of the area. Specifically, it is recommended that the centerline selection, construction, and maintenance be performed according to criteria presented in two handbooks: National Forest Landscape Management, Volume 2 - Utilities (USDA Handbook 478)

and Environmental Criteria for Electric Transmission Systems (U.S. Dept. of Interior and USDA), and, in addition, those mitigating measures for line construction that follow:

(1) Restrict the cross-country movement of machinery where access roads are not available to certain designated routes, and flag machinery for visibility. Off-route travel should be limited to pole sites.

(2) Limit construction to dry periods when accessibility is optimum and soil disturbance will be at a minimum.

(3) Close and seed roads or travel routes with a mixture of at least three of the following species, unless the land owner requests otherwise:

Generic Name	Common Name	Pounds Seed* Per Acre
Agropyron cristatum	crested wheatgrass	12.4
Agropyron dasystachyum	thickspike wheatgrass	13.4
Agropyron inerme	beardless wheatgrass	10.9
Agropyron riparium	streambank wheatgrass	11.2
Agropyron smithii	western wheatgrass	18.8
Elymus junceus	Russian wildrye	15.6
Festuca ovina var. duriscula	sheep fescue	12.4
Stipa viridula	green needlegrass	52.2
Dactylis glomerata	orchardgrass	4.2
Phleum pratense	timothy	3.4

*For mixture, divide by number of species in mixture.

(4) Cross stream and gully channels at right angles and protect the banks from damage by temporary bridges or culverts.

As a result of this investigation, the Department concludes that there is an electrical need for the proposed Broadview-Alkali Creek 230 kV transmission line and that the construction of the line will not significantly affect the quality of the physical and cultural environments. Therefore, compilation of an environmental impact statement on this project is not required.

ENVIRONMENTAL ANALYSIS ON BROADVIEW-ALKALI CREEK 230 kV TRANSMISSION LINE

I. Introduction

On December 31, 1974, an application was received by the Montana Department of Natural Resources and Conservation (hereafter referred to as the Department) for permission to construct approximately 19 miles of 230 kV transmission line from the Alkali Creek substation to the Broadview substation. This application was submitted by The Montana Power Company (hereafter referred to as the applicant or MPC) in accordance with the Utility Siting Act of 1973. Under the Utility Siting Act, the Department was required to submit its recommendations on this project by August 23, 1976. Due to insufficient information provided by the applicant, however, the Department was unable to meet this deadline. The MPC and the Department therefore agreed upon a two-week extension of time, moving the deadline to September 7, 1976.

The application and subsequent communication with the applicant have indicated that the existing 50 kV line and the Great Falls-Billings 100 kV "A" line would be removed between Broadview and Alkali Creek upon completion of the proposed 230 kV line in 1977. Figure 1 is a locater map showing the applicant's preferred and alternative routes for the proposed 230 kV line. This report presents a description of the proposed action and alternative actions, the electrical need for the proposed action is analyzed, and the risk for environmental impact along the applicant's preferred routes is discussed.

II. Engineering and Electrical Need Analysis

A. Description and Specifications

The applicant proposed to build a 19-mile 230 kV transmission line connecting the 230 kV bus at the Broadview substation with the Alkali Creek 230 kV

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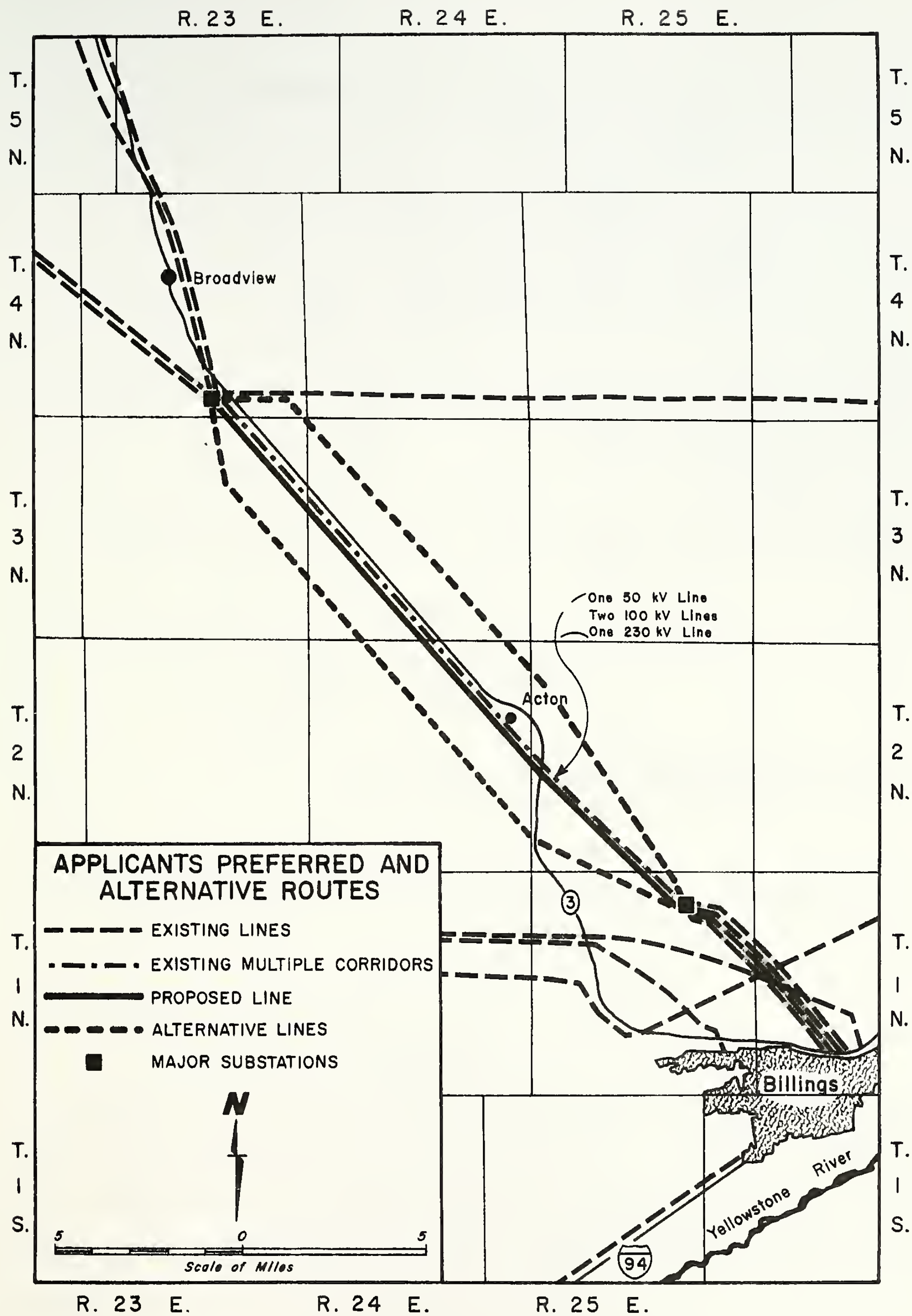


LOCATER MAP

FIGURE 1

bus. An oil circuit breaker would be installed at each end of the proposed line. Design specifications for the facility are as follows:

1. Conductor....type: ACSR
   size: 1,272,000 circular mills
   quantity: one per phase (a total of three)

2. Ground Wire....type: 7 strand high-strength steel
   size: 3/8-inch diameter
   quantity: two

3. Supports....type: wood poles (see Figure 2)
   size: depends upon terrain (from about 50 feet to 75 feet)
   quantity: two per structure; three per structure for angle positions

4. Ground Clearance: minimum 32 feet at +60°F generally in line with National Electric Safety Code

5. Guys: used as and when required

6. Insulators....type: grey porcelain
   size: 10-inch diameter
   quantity: 12 per phase

7. Thermal Capacity: 478 MVA, assuming a conductor temperature rise of 50° C over an ambient temperature of 25° C and wind at 1.4 miles per hour.

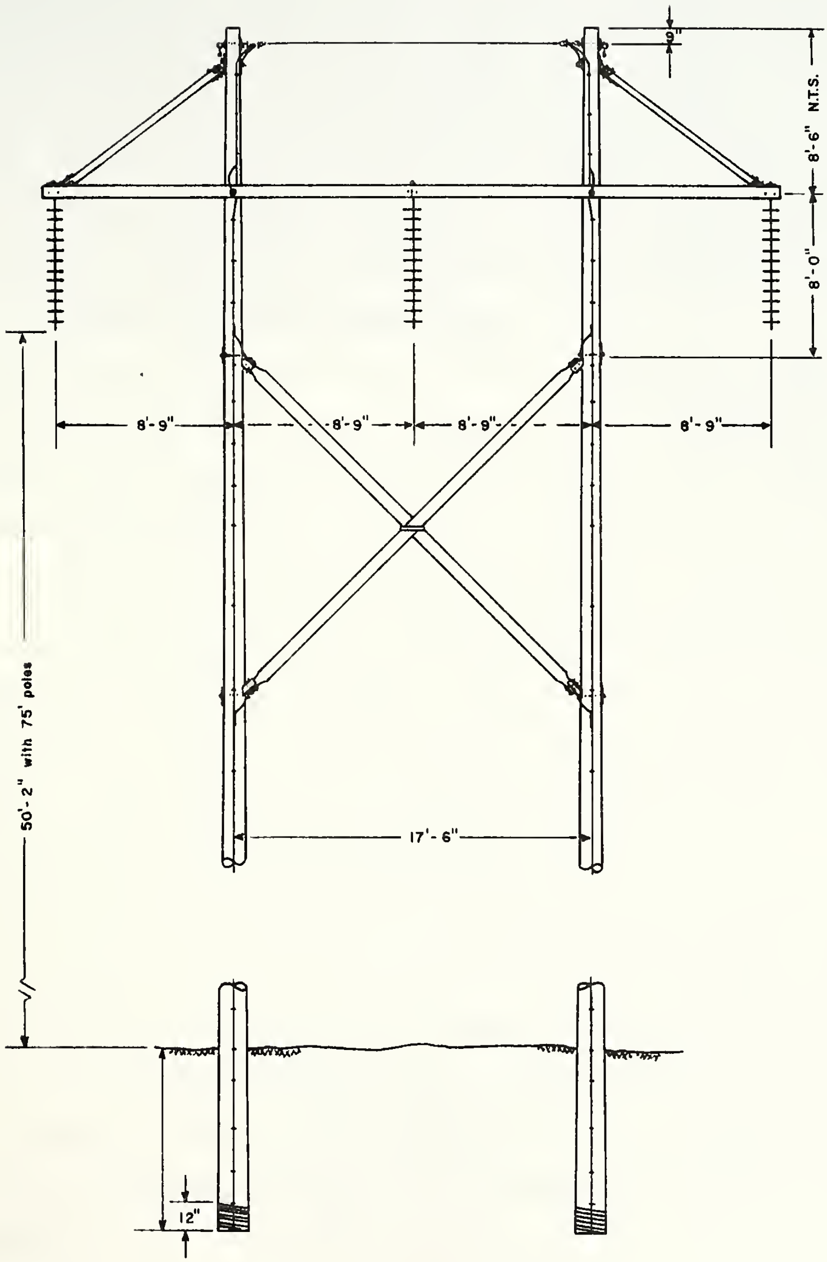
8. Power Loss: 0.7 MW - 0.15% of thermal rating

9. Theoretical voltage gradient (for corona): 17 kn/cm 66% of critical gradient

B. <u>Electrical Need Analysis</u>

1. <u>Existing MPC Power System</u>

The Montana Power Company's power system consists of several power stations feeding into transmission lines of up to 230 kV. Most of the power plants are of comparatively small capacity, generally adequate for the needs of surrounding areas with a little left over for export to adjacent sections of the MPC system.



H- TYPE STRUCTURE

FIGURE 2

One exception to the above is the 170 MW power demand at Anaconda. This power requirement has been met by power imports into Anaconda. Prior to the construction of two 350 MW units at Colstrip, a major proportion of the power demand was filled by the Bonneville Power Administration. Figure 3 shows the MPC 230·kV system. Also shown is a 161 kV transmission line between Anaconda and Yellowtail, together with its various connections to the 230 kV system.

2. Normal and Abnormal Power Flows

Figure 3 shows the normal MW flows in various sections of the major power lines constituting the MPC system. Under normal operating conditions during summer 1976, Colstrip delivers 630 MW into the Billings area. Generation in the Billings area totals 156 MW, resulting in a total power input of 786 MW into the Billings area, of which 566 MW is transmitted out of the Billings area. Of the total export from the Billings area, approximately 400 MW (70 per cent) flows through one substation--Broadview. Two of five lines exporting power from the Billings area carry almost 70 per cent of the total power exported. Under normal system conditions, all power flows are within capacity limits of individual pieces of equipment and transmission lines.

Figure 4 shows the system under an outage condition. The 230 kV line between Alkali Creek and Clyde Park, the line exporting the highest amount of power from Billings, is out on fault. MW power flows are also shown in Figure 4. The Alkali Creek-Clyde Park 161 kV line is heavily loaded, but no overloads occur. Generally acceptable voltage levels are maintained throughout the system except at the Clyde Park 161 kV bus, where the voltage level is marginally acceptable.

Figure 5 shows the system with an outage on the 230 kV lines between Broadview and Billings and between Billings and Alkali Creek. For approximately the first two miles out of the Billings 230 kV substation, these two

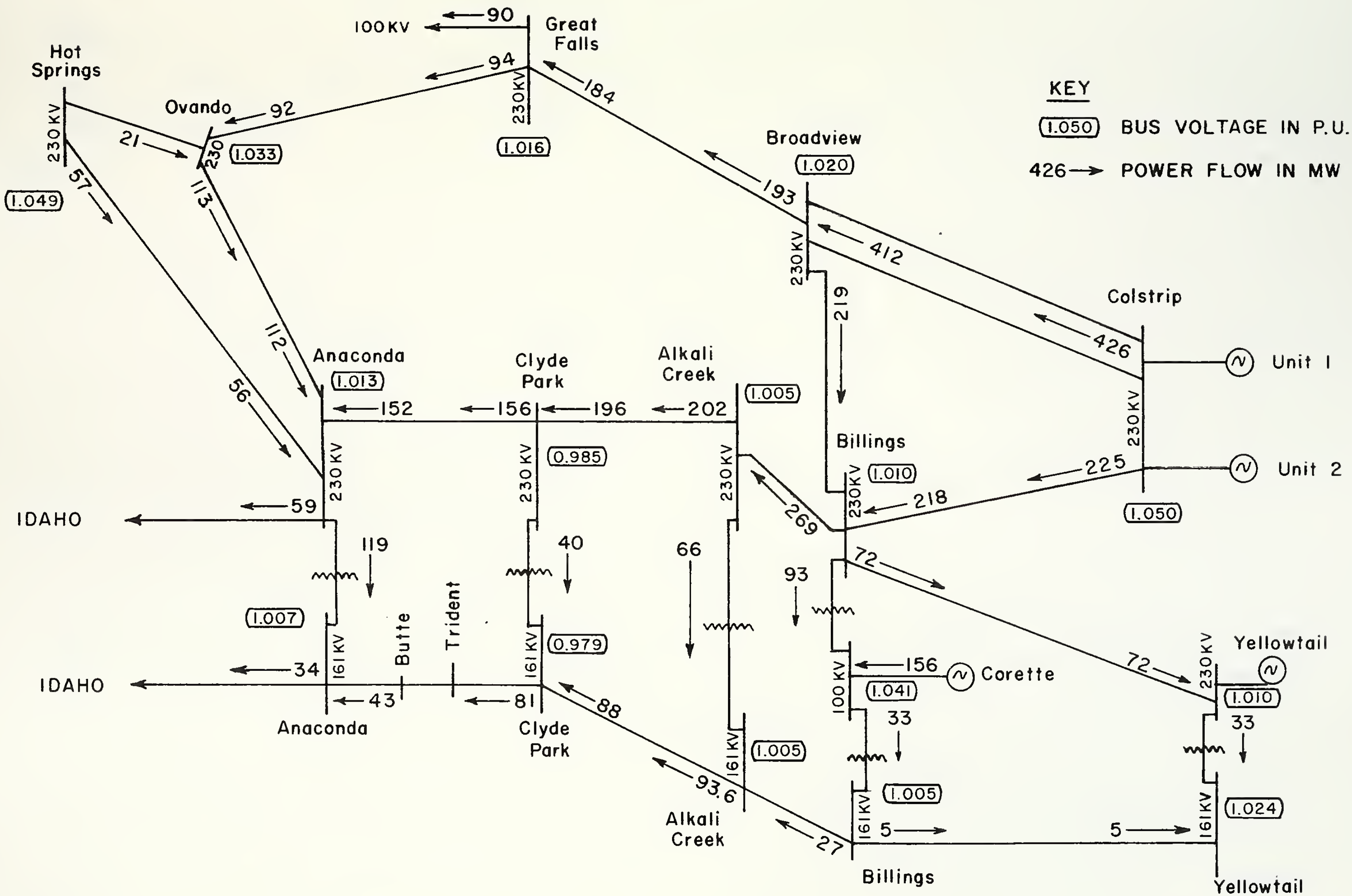


FIGURE 3 SYSTEM VOLTAGES AND POWER FLOWS UNDER NORMAL CONDITIONS

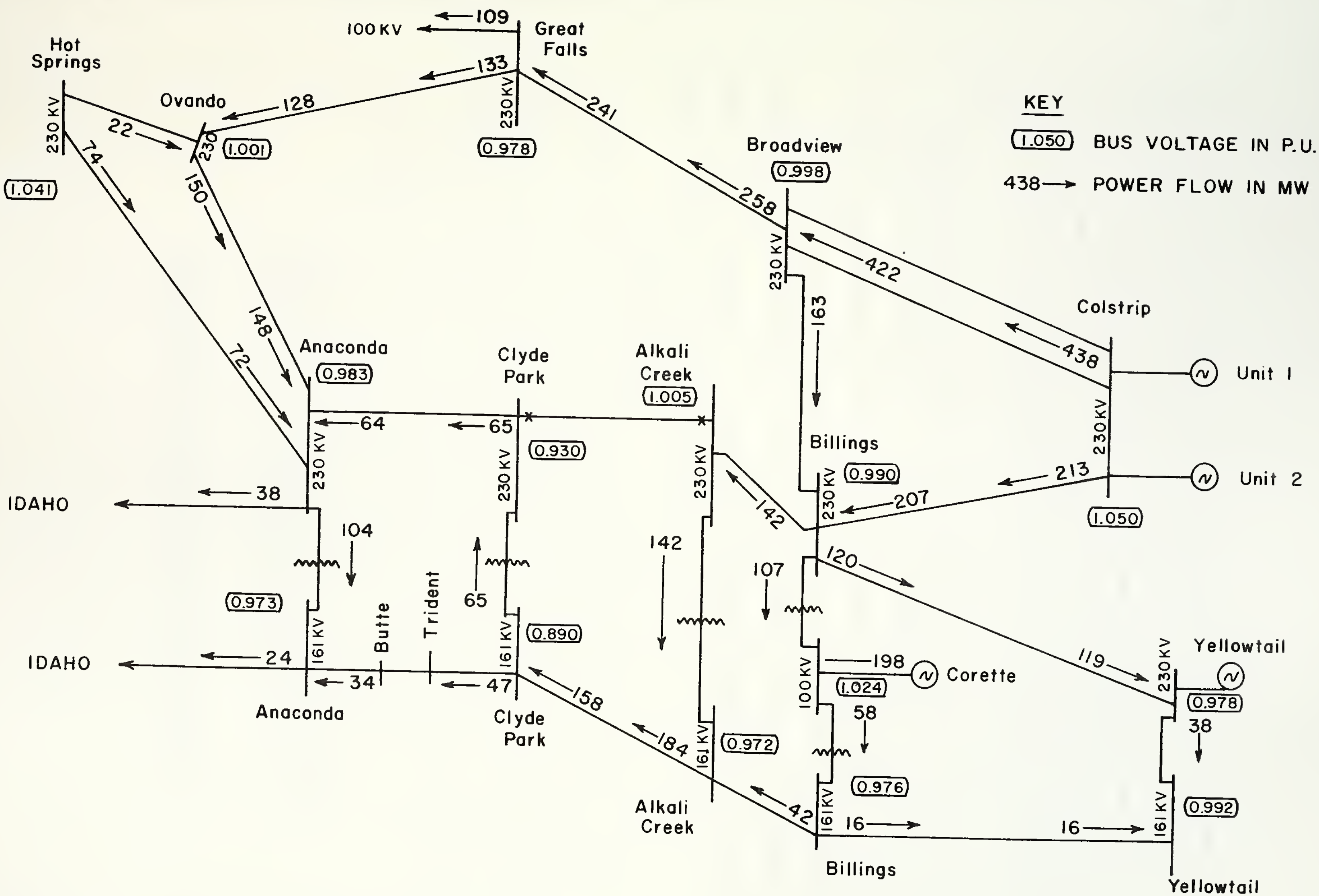


FIGURE 4 SYSTEM VOLTAGES AND POWER FLOWS WITH ALKALI CREEK - CLYDE PARK 230KV LINE OUT

lines are built on a single structure. It is therefore possible to lose both lines through one accident. Power flows for such a situation are shown in Figure 5. In the absence of a 230 kV path between the Billings area and Alkali, large amounts of power flow through the 100 kV and 161 kV system between Billings and Alkali Creek, resulting in the following overloads in the Billings area:

5 per cent overload of the 230/100 kV transformers

130 per cent overload of the 161/100 kV transformers

5 per cent overload of the 161 kV Billings-Alkali Creek line

While a 5 per cent overload on the 230/100 kV transformers can be accommodated on a short-term basis, the other two overloads will cause permanent damage to the equipment. It is therefore necessary to either avoid such overloads or reinforce the affected plant.

3. Proposed Solution

MPC proposes to build a 230 kV line between Broadview and Alkali Creek. Such a line will provide a second 230 kV feed into Alkali Creek, thereby virtually guaranteeing power input into Alkali Creek at 230 kV. This will eliminate the difficulties associated with outage conditions shown in Figure 5.

Building a 230 kV line between Broadview and Alkali Creek has other beneficial effects on the 230 kV system. These are listed below:

(1) Provide a second 230 kV paralleling link between the three Colstrip-Billings area 230 kV circuits, thereby improving power sharing between the three 230 kV lines during an outage of either the Broadview-Billings or the Broadview-Alkali Creek 230 kV lines.

(2) Provide a more direct route for power flow from Broadview to Alkali Creek, and, thus, release capacity on the Broadview-Billings-Alkali Creek 230 kV lines.

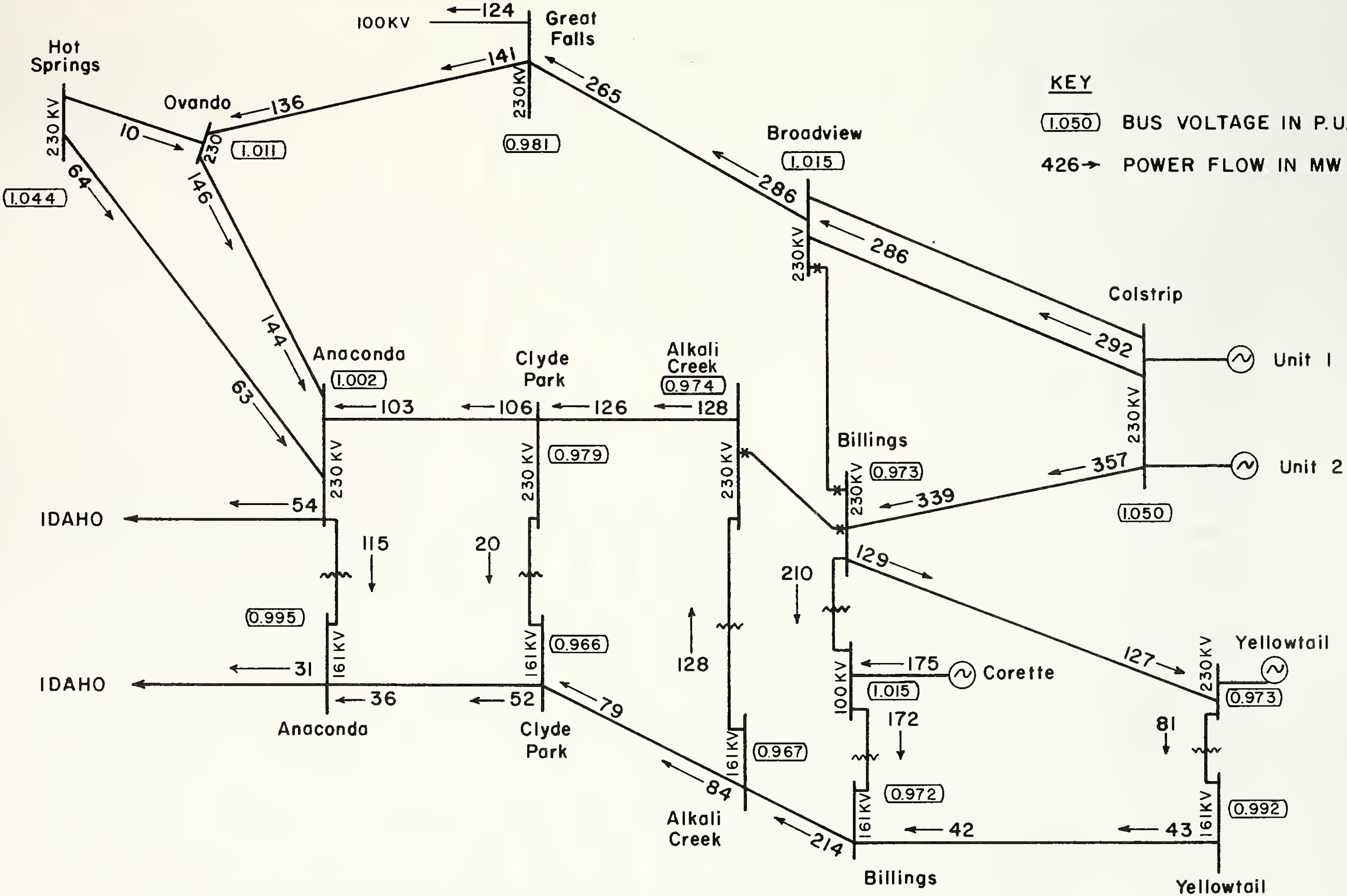


FIGURE 5 SYSTEM VOLTAGES AND POWER FLOWS WITH BROADVIEW–BILLINGS–ALKALI CREEK 230KV LINES OUT

(3) Increase the 230 kV transmission capacity out of the Broadview substation. Since Broadview will be one of two feeds into the 230 kV system after the Colstrip-Hot Springs 500 kV lines are built in 1980 (Figure 6), 230 kV transmission capacity out of Broadview will determine satisfactory operation of the eastern half of the MPC 230 kV system.

Another short-term advantage (1977-1980) of building a 230 kV line between Broadview and Alkali Creek is associated with an increase in the 230 kV transmission capacity out of Broadview. The advantage is explained below.

Two of the highest capacity 230 kV lines in the State connect Colstrip to the Broadview substation. These lines can deliver the full capacity of Colstrip Units 1 and 2 to the Broadview substation if a fault were to occur on the Colstrip-Billings 230 kV line. Broadview has two 230 kV lines and three 100 kV lines taking power out of the Broadview substation. If a fault were to occur on the Broadview-Billings 230 kV line while the Colstrip-Billings 230 kV line is out of service--a rare but possible double contingency--the 230 kV line from Broadview to Great Falls and the three 100 kV lines fed off the 230/100 kV substation at Broadview would have to carry the full power coming into Broadview. If the transmission capacity out of Broadview is inadequate, power unbalance will instantly occur at Colstrip Units 1 and 2--an unacceptable condition for stable system operation. Calculations submitted by the MPC show that the Broadview-Great Falls 230 kV line, paralleled by a 100 kV route, can carry a maximum of 74 per cent of the power coming into the Broadview substation. The transmission capacity of two 100 kV feeders has not been analyzed by the MPC. Since the 230/100 kV transformers are of the autotransformer type, it is likely that the two 100 kV circuits can transmit the remaining 26 per cent of the power coming into Broadview, and, thus, maintain system stability under a two-lines-out contingency. The construction of a 230 kV line between Broadview and Alkali Creek would, however, tremendously increase

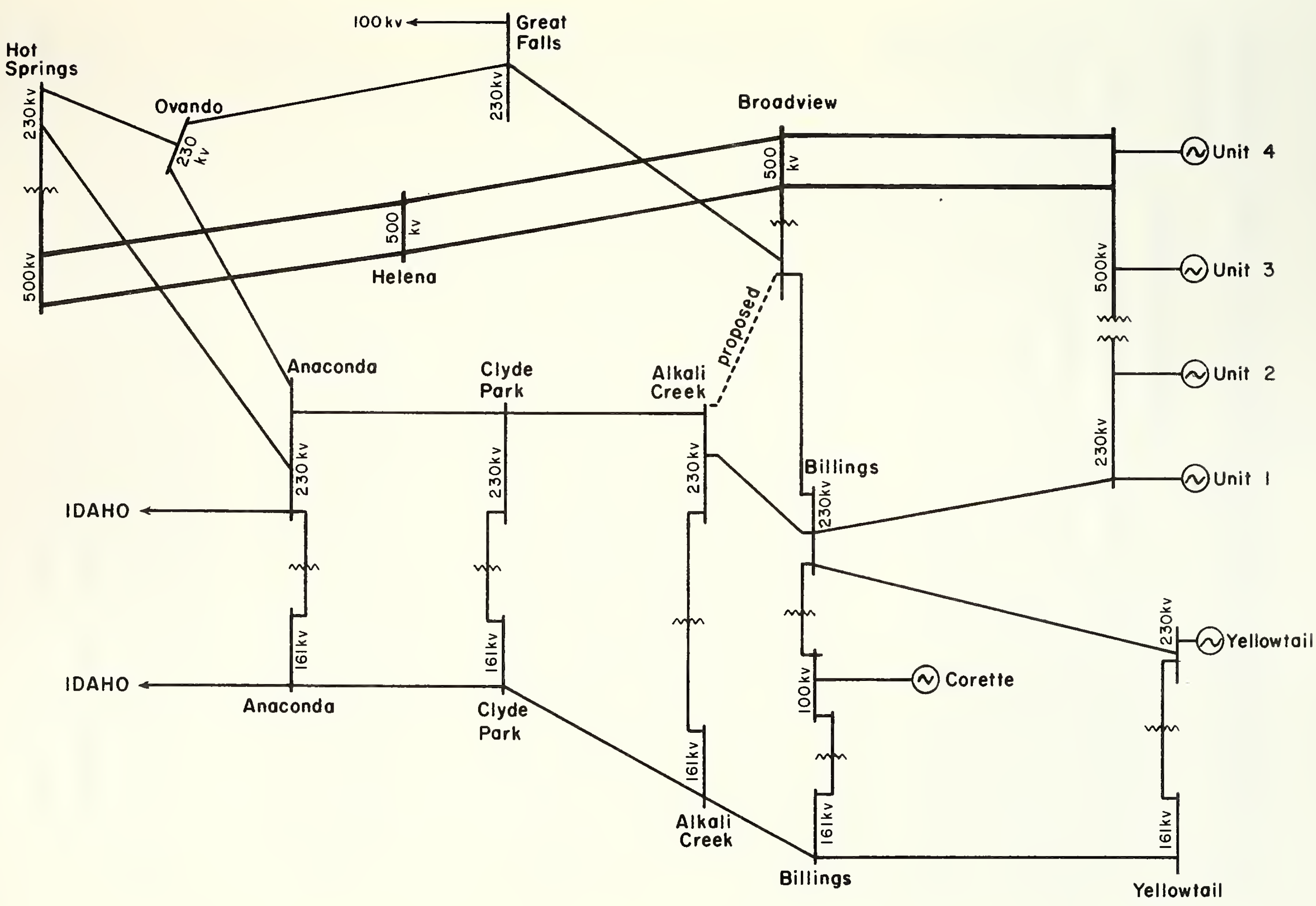


FIGURE 6 MONTANA POWER COMPANY SYSTEM IN 1980

transmission capacity out of Broadview and guarantee stability during a two-line outage.

4. Alternatives Considered

Apart from the alternative of not building a 230 kV line between Broadview and Alkali Creek, the MPC considered building a 230 kV line from Colstrip to Alkali Creek. A line from Colstrip to Alkali Creek would be substantially longer than the proposed line, and, in view of the planned construction of two 500 kV lines from Colstrip to Broadview and Hot Springs, it would not provide any extra benefit.

The alternative of not building any line would not solve the problem outlined in section B.2. (Normal and Abnormal Load Flows). A possible alternative is to reinforce the items of plant overloaded under the contingency considered viz the 230/100 kV and the 161/100 kV transformers at Billings and the Billings-Alkali Creek 161 kV line. Such reinforcement, however, would not improve the normal operation of the system and would have no effect on the future development of the system. As explained in section B. 3., building a 230 kV line between Broadview and Alkali Creek offers several power flow advantages, both short-term and long-term.

5. Conclusion

The foregoing analysis has identified a problem and examined possible solutions. Based upon engineering analyses alone, construction of a 19-mile electric transmission line between Broadview and Alkali Creek would be the optimum solution.

III. Determination of the Extent of Environmental Impacts

The Department has conducted intensive studies on transmission line applications and has reported the results in environmental impact statements released during a period from mid 1974 to the present. Although specific

impacts upon the natural and cultural environments are unique for each transmission line, there are general impacts that all share. For example, all overhead transmission lines are visible to some portion of the population. The portion of the population affected and the kind of effects which occur are unique to a particular line. The reader is referred to the following environmental impact statements prepared by this Department:

1. Anaconda-Hamilton 161 kV Transmission Line, July 1976
2. Clyde Park-Dillon 161 kV and 69 kV Transmission Lines, January 1976
3. Colstrip Electric Generating Units 3 & 4, 500 kV Transmission Lines and Associated Facilities, Volume Four--Transmission Lines, November 1974

Personnel responsible for conducting this study relied upon the cumulative investigations and knowledge of the Department's Energy Planning Division. The results of intensive studies completed for other high voltage transmission lines were adapted to the Broadview-Alkali Creek application. It was determined that except for certain impacts discussed in section III.B. below (Cultural Characteristics and Impacts), the proposed line would have negligible impacts due to its location and short length.

A. Biophysical Environment

1. Geology and Physiography

Preferred and alternative routes cross the Comanche Basin, a shallow and poorly-drained depression underlain with alluvium, extending roughly from Acton to Broadview. Within this basin the topography is nearly flat. Southeast of Acton, sedimentary rocks of upper Cretaceous and Tertiary age (consisting primarily of shales, claystones, and siltstones) have contributed to a relatively rugged topography with a few steep escarpments and rimrock-like outcrops.

Alternative "B" would cross considerably more of this rugged terrain than the applicant's preferred route or alternative "A."

Construction of a 230 kV line along the applicant's preferred route would not adversely affect the geological environment, nor does geology or terrain place significant constraints upon construction along this route.

2. Climate

Average annual precipitation in this area ranges from 12-14 inches per year, with most falling during the growing season (April to September). This relatively low precipitation is not conducive to erosion or sedimentation under normal conditions. High winds are not expected to be a significant threat to line reliability in this area.

3. Hydrology

No perennial streams are crossed by preferred or alternative routes. Many temporary lakes, marshes, or ponds, however, are found in the poorly-drained Comanche Basin; these are corssed by existing transmission lines in several places along the preferred route. Construction through one of these water areas in spring would be difficult, and would result in locally heavy rutting and erosion. Construction would be somewhat easier in late summer or fall when the area is dry, but consideration should be given to the probable future pattern of inundation. No significant impacts to groundwater are expected to result from line construction through this area.

4. Soils

In evaluating the proposed corridor in terms of potential soil hazards, soils were assessed for erosion hazards and accessibility problems. The primary value in identifying these soil hazards is to assign mitigative measures that will minimize impacts. The Soil Survey of Yellowstone County, Montana, March 1972, was used to make the following assessment.

Throughout the area, the dominant soil material is clay. Much of this clay is montmorillonite, which expands and becomes plastic when wet. Akla-line soils occur along the preferred route, especially in the vicinities of Acton, Comanche, and Comanche Creek. When wet, alkaline soils present many of the same problems as montmorillonitic soils. Access problems occur when these soils are wet because of their plasticity, but when dry, the soils are hard enough to support heavy equipment. Thus, it is reasonable to assume that construction should occur only during dry periods of the year. From Acton south to the substation, the soils are more susceptible to water erosion than north of Acton. This is due largely to the increased slope of the rolling breaks, the increase in dissection by ephemeral streams, and to an increase of soil particle size. Most soils in the corridor are susceptible to wind erosion.

5. Vegetation

a. Rangeland

The three grassland dominants of the area are blue grama, western wheat-grass, and needle-and-thread. Other grasses that are locally dominant are Sandberg bluegrass, green needlegrass, bluebunch wheatgrass, and prairie june-grass. Threadleaf sedge and needleleaf sedge are also locally abundant, as are phloxes.

Shrubs are co-dominant with grasses in much of the area, and the most common shrubs are the sagebrushes. Fringed sagewort is most frequently en-countered, but big sagebrush seems to exert a strong community influence when present. Silver sagebrush is locally abundant, especially towards the Alkali Creek substation. These shrubs and plains pricklypear may owe their abundance on many sites to extensive over-grazing.

The only other distinctive rangeland community of significant extent is found in lowlands of the Comanche Basin having heavy and alkaline soils, and is dominated by greasewood and western wheatgrass.

Adverse impact to rangeland vegetation is expected to be negligible unless road-building requires earthmoving. The existing lines in the area have not required construction of access roads, and recovery from cross-country travel seems to be fairly rapid.

b. Forests

Trees are sparse along the applicant's preferred route, but timbered stands are encountered in the hills near Acton. Ponderosa pine is the only coniferous tree species. Some stands resemble the ponderosa pine/bluebunch wheatgrass habitat type, while others are best termed savannah. Basal areas and mean tree heights are low, and growth is slow. These stands often occur in areas of sandstone outcrop.

Understory associates include many previously-mentioned prairie species, and also Rocky Mountain juniper and skunkbrush sumac. The understory of these stands is often sparse.

The forested areas occur on rigorous sites, and it is expected that recovery from disturbance will be slow. Regeneration also appears to be very slow. For these reasons, rangeland is preferable to forested areas for line location.

6. Fauna

Line construction through the area of the proposed line is not expected to significantly affect populations of fish or other aquatic organisms. The temporary ponds and marshes in the area of the proposed line do not support a fishery of any importance.

Although the area contains excellent habitat for mule deer and pronghorn, construction and operation of a 230 kV transmission line will not adversely affect habitat of these species or interfere with movements. The only important adverse impact to wildlife expected to result from the proposed line is wire strikes by birds, primarily waterfowl. Comanche Basin is heavily used by a variety of waterfowl in spring and early summer, when ponds and ditches are full. The four existing transmission lines cross many of these water areas, and losses of waterfowl to wire strikes are locally heavy, especially during fog or stormy weather. A search by Department personnel revealed the remains of two horned grebes, one coot, one yellow-headed blackbird, one ring-necked pheasant, and five unidentified ducks beneath the Great Falls-Billings 100 kV "A" line between Acton and Comanche. These birds had apparently died as a result of collisions with conductors during a recent rainy period, as most had severed or broken wings. Some waterfowl losses due to the proposed line are unavoidable; however, these losses may be minimized by avoiding water areas of high waterfowl use, and may be offset somewhat by removal of the existing 100 kV and 50 kV lines.

B. Cultural Characteristics and Impacts

The area crossed by the applicant's preferred route is primarily rangeland, with some cultivated land located near Acton. However, with four existing lines in close proximity, the major land use along this route can be said to be transmission lines. If two of these lines are replaced by one, as the applicant has proposed, effects on land use will be negligible. Less area will be taken by poles, resulting in less interference with other land uses. Visual impact will be less, simply because there will be fewer configurations to view, and the lines will be located farther from Highway 3.

It is also assumed that the tax base will change little because the valuation difference between the proposed line and the two smaller lines will be small. The number of construction workers needed will have little impact on the economy or social base of the area.

The proposed line, however, may result in certain "physical presence" impacts which are broadly classified as social. These are primarily nuisance impacts, being limited in scope, and are capable of being rectified through engineering design and conscientious supervision of construction and maintenance activities. Frequently listed impacts of this type include:

(1) Property damage to crops, agricultural land, fences, and gates by construction and maintenance crews straying off the right-of-way or access roads with private vehicles and construction equipment.

(2) Domestic animals escaping from enclosures because transmission line workers left gates open or damaged fences. Loose livestock constitute a hazard to operators of motor vehicles, a potential property loss to their owners if they are killed, injured, or lost, and a possible source of crop damage.

(3) Construction and maintenance activities not being followed with sufficient clean-up and restoration. Special reference is made to inadequate debris disposal and improper vegetative reseeding.

(4) Tower structures interfering with movement of agricultural equipment, a problem which is aggravated by more than one line occupying a single right-of-way.

(5) Aesthetic impacts (for example, large road cuts).

The overall social impact of the proposed line is expected to be negligible.

Persons, Agencies and Groups Contacted in Relation to the Proposed Action

Buck Compton, Montana Department of Fish and Game, Billings
Rich Johnson, U.S. Fish and Wildlife Service, Billings
Montana Department of Health and Environmental Sciences
USDA, Soil Conservation Service

Other Sources of Data

Montana Department of Fish and Game. 1976. Montana statewide outdoor recreation plan. Helena, Montana.

Montana Department of Fish and Game. 1975. Montana historic preservation plan, with historic sites compendium. Helena, Montana. Volumes I-III.

Personnel Responsible for the Investigation

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